Vamsi K Ithapu

CONTACT

5780 Medical Sciences Center
1300 University Avenue
Madison, WI 53706-1510 USA

ithapu@wisc.edu
+1 608-658-2278
http://pages.cs.wisc.edu/~vamsi/

EDUCATION

University of Wisconsin-Madison, Madison, Wisconsin, USA

Doctor of Philosophy (Ph.D) Candidate, Computer Sciences — Jan 2012 - present
Minors: Electrical and Computer Engineering, Statistics
Grade Point Average: 3.58/4
Thesis: Learning and Inference Algorithms for Neuroimaging-based Clinical Trials
Advisor: Vikas Singh

Indian Institute of Technology, Guwahati, India

Bachelor of Technology, Electronics and Communication Engineering — Aug 2006 - May 2010
Grade Point Average: 8.52/10
Thesis: Investigation of Diversity in Multiple Input Multiple Output (MIMO) SAR Imaging Systems
Advisor: Amit Kumar Mishra

WORK EXPERIENCE

- *Research Assistant* — Jul 2013 - present
- *Project Assistant* — Jan 2012 - Jun 2013
  Wisconsin Alzheimer's Disease Research Center, University of Wisconsin-Madison, Madison USA
- *Teaching Assistant* — Aug 2011 - Dec 2011
  Course: Introduction to Computer Engineering
  Electrical and Computer Engineering, University of Wisconsin-Madison, Madison USA
- *Research Engineer* — Aug 2010 - Jun 2011
  Acoustic Research Laboratory, National University of Singapore, Singapore
- *Research Intern* — May 2009 - Jul 2009
  Dept. of Medical Informatics, RWTH Aachen University, Aachen, Germany

RESEARCH INTERESTS

Machine Learning and Computer Vision
- Revealing structure in Unsupervised data, Matrix Factorization, Multi-scale methods
- Theory and Design of Deep Networks, Regularizing Neural Networks
- Interpretability/Explainability of Nonlinear Models

Nonparametric Statistics
- Computationally Efficient Testing, Robust Resampling Methods

Applications
- Learning Models in Data Sciences, Deep Network Designs for Biomedical studies
- Multi-source Data Integration/Harmonization

PUBLICATIONS

Conferences

1. **V. K. Ithapu**, Decoding the Deep: Exploring Class Hierarchies of Deep Representations using Multiresolution Matrix Factorization, Explainable Computer Vision Workshop, 2017
   [**Oral Presentation**]
2. H. Hao, Y. Zhang, **V. K. Ithapu**, G. Wahba, S. C. Johnson, V. Singh, When can Multi-site Datasets be Pooled for Regression: Hypothesis Tests, ℓ_2-consistency and Neuroscience Applications, International Conference on Machine Learning (ICML), 2017

3. **V. K. Ithapu**, R. Kondor, S. C. Johnson, V. Singh, The Incremental Multiresolution Matrix Factorization Algorithm, Computer Vision and Pattern Recognition (CVPR), 2017

4. **V. K. Ithapu**, S. Ravi, V. Singh, On the Interplay of Network Structure and Gradient Convergence in Deep Learning, 54th Allerton Conference on Communication, Control and Computing, 2016

5. H. Hao, **V. K. Ithapu**, S. Ravi, V. Singh, G. Wahba, S. C. Johnson, Hypothesis Testing in Unsupervised Domain Adaptation with Applications in Alzheimer's Disease, Neural Information Processing Systems (NIPS), 2016

6. S. Ravi, **V. K. Ithapu**, S. C. Johnson, V. Singh, Experimental Design on a Budget for Sparse Linear Models and Applications, International Conference on Machine Learning (ICML), 2016

7. L. Mukherjee, S. Ravi, **V. K. Ithapu**, T. Holmes, V. Singh, An NMF perspective on Binary Hashing, International Conference on Computer Vision (ICCV), 2015

8. S. J. Hwang, M. Collins, S. Ravi, **V. K. Ithapu**, N. Adluru, S. C. Johnson, V. Singh, A Projection Free Method for Generalized Eigenvalue Problem with a Nonsmooth Regularizer, International Conference on Computer Vision (ICCV), 2015

9. **V. K. Ithapu**, S. Ravi, V. Singh, Convergence of Gradient based Pre-training in Denoising Autoencoders, arxiv:1502.03537

10. **V. K. Ithapu**, V. Singh, O. Okonkwo, S. C. Johnson, Randomized Denoising Autoencoders for Smaller and Efficient Imaging based AD Clinical Trials, Medical Image Computing and Computer Assisted Intervention (MICCAI), 2014

11. **V. K. Ithapu***, C. Hinrichs*, Q. Sun, S. C. Johnson, V. Singh, Speeding up Permutation Testing in Neuroimaging, Advances in Neural Information Processing Systems (NIPS), 2013
    * : Ithapu and Hinrichs contributed equally **[Oral Spotlight]**

12. J. Xu, **V. K. Ithapu**, L. Mukherjee, J. Rehg, V. Singh, GOSUS: Grassmannian Online Subspace Updates with Structured-sparsity, International Conference on Computer Vision (ICCV), 2013

13. **V. K. Ithapu**, A. Fritsche, A. Oppelt, M. Westhofen, T. M. Deserno, Fundus Image Registration for Vestibularis Research, Proceedings of SPIE Medical Imaging, 2010

14. **V. K. Ithapu**, A. K. Mishra, R. K. Panigrahi, Diversity Employment into Target plus Clutter SAR Imaging using MIMO Configuration, Indian Antenna Week, 2010

15. **V. K. Ithapu**, A. K. Mishra, Hybrid Diversity Strategy using MIMO Radar for Target Tracking, IEEE Applied Electromagnetics Conference (AEMC), 2009

Journals

16. F. Gutierrez-Barragan, **V. K. Ithapu**, C. Hinrichs, C. Maumet, S. C. Johnson, T. E. Nichols, V. Singh, Accelerating Permutation Testing in Voxel-wise Analysis through Subspace Tracking: A new plugin for SnPM, Neuroimage, 2017 **[Impact Factor: 6.9]**

17. **V. K. Ithapu**, S. Ravi, V. Singh, On Architectural Choices in Deep Learning: From Network Structure to Gradient Convergence and Parameter Estimation, In: Submitted (arXiv:1702.08670)

18. N. N. Kumar, M. Gautam, J. J. Lochhead, D. J. Wolack, **V. K. Ithapu**, V. Singh, R. G. Thorne, Relative Vascular Permeability and Vascularity across different regions of the rat nasal mucosa: Implications for Nasal Physiology and Drug Delivery, *Nature* Scientific Reports, 2016 **[Impact Factor: 4.8]**

19. **V. K. Ithapu**, V. Singh, O. C. Okonkwo, R. J. Chappell, N. M. Dowling, S. C. Johnson, Imaging based Enrichment Criteria using Deep Learning Algorithms for Efficient Clinical Trials in MCI, Alzheimer's and Dementia, 2015 **[Impact Factor: 13.2]**

20. **V. K. Ithapu**, V. Singh, C. Lindner, B. Austin, C. Hinrichs, C. Carlsson, B. Bendlin, S. C. Johnson, Extracting and Summarizing White Matter Hyperintensities using Supervised Segmentation Methods in Alzheimer's Disease Risk and Aging Studies, Human Brain Mapping, 2013 **[Impact Factor: 6.0]**

21. **V. K. Ithapu**, A. K. Mishra, Cooperative Multi-Monostatic SAR: A New SAR Configuration for Improved Resolution, IEEE Antennas and Wireless Propagation Letters, 2010

Abstracts

22. **V. K. Ithapu**, Decoding Deep Networks, Midwest Machine Learning Symposium (MMLS), 2017 **Finalist, Best Poster**

23. T. Vo, **V. K. Ithapu**, V. Singh, M. Newton, Multiple Hypothesis Testing with Graph-Associated Data, Center for Predictive Computational Phenotyping (CPCP) Retreat, 2017

24. **V. K. Ithapu**, R. Kondor, S. C. Johnson, V. Singh, Generalizing Statistical Leverage Scores using Incremental Multiresolution Matrix Factorization, Center for Predictive Computational Phenotyping (CPCP) Retreat, 2017

25. **V. K. Ithapu**, L. Clark, V. Singh, R. Koscik, S. C. Johnson, Deductive Mode Finding: Tracing Back Cognitive Decline in Biomarker Positive Middle-Aged Adults, Alzheimer's Association International Conference (AAIC), 2017

26. H. Zhou, **V. K. Ithapu**, S. Ravi, V. Singh, S. C. Johnson, G. Wahba, R. L. Koscik, S. Asthana, C. M. Carlsson, K. Blennow, H. Zetterberg, Statistical Algorithms for Harmonizing Biomarker Distributions Across Different Cohorts, Sites and Assays: Applications to CSF Measurements, Alzheimer's Association International Conference (AAIC), 2017

27. S. Ravi, **V. K. Ithapu**, V. Singh, R. Koscik, S. C. Johnson, Machine Learning Algorithms for Experiment Design in High Dimensional Longitudinal Cohort Studies: Implications for Clinical Trials, Alzheimer's Association International Conference (AAIC), 2017

28. H. Zhou, S. Ravi, **V. K. Ithapu**, S. C. Johnson, G. Wahba, V. Singh, Hypothesis Testing in Unsupervised Domain Adaptation with Applications in Neuroscience, Center for Predictive Computational Phenotyping (CPCP) Retreat, 2016

29. T. Vo, **V. K. Ithapu**, V. Singh, M. Newton, Graph Partitioning: Mixtures for Modeling and Clustering Graph-associated Data, Center for Predictive Computational Phenotyping (CPCP) Retreat, 2016

30. **V. K. Ithapu**, V. Singh, O. Okonkwo, S. C. Johnson, A Predictive Multimodal Imaging Marker for Designing Efficient and Robust AD Clinical Trials, Clinical Trials on Alzheimer's Disease (CTAD), 2014

31. **V. K. Ithapu**, V. Singh, O. Okonkwo, R. J. Chappell, S. C. Johnson, A Predictive Multimodal Imaging Marker for Efficient Sample Enrichment in AD Clinical Trials, Alzheimer's Association International Conference (AAIC), 2014

32. **V. K. Ithapu**, V. Singh, B. Austin, C. Hinrichs, C. Carlsson, B. Bendlin, S. C. Johnson, Extracting White Matter Hyperintensities in Alzheimer's Disease Risk and Aging Studies using Supervised Segmentation Methods, Alzheimer's Association International Conference (AAIC), 2013

BOOK CHAPTERS

1. **V. K. Ithapu**, V. Singh, S. C. Johnson, Randomized Deep Learning Methods for Clinical Trial Enrichment and Design in Alzheimer's Disease, Deep Learning for Medical Image Analysis (1st Edition) ISBN: 9780128104088; Chapter 15

Selected Talks

1. Decoding the Deep: Exploring Class Hierarchies of Deep Representations using Multiresolution Matrix Factorization, Explainable Computer Vision Workshop, CVPR 2017
2. Machine Learning Methods for Enriching Clinical Trials in Preclinical Alzheimer's Disease, Mayo Symposium on the BRAIN Initiative, 2017
3. On the Interplay of Network Structure and Gradient Convergence in Deep Learning, Allerton Conference on Communications, Control and Computing (ALLERTON), 2016
4. A Predictive Multimodal Imaging Marker for Designing Efficient and Robust AD Clinical Trials, Clinical Trials on Alzheimer's Disease (CTAD), 2014
5. Speeding up Permutation Testing in Neuroimaging, Advances in Neural Information Processing Systems (NIPS), 2013

Patents

1. **V. K. Ithapu**, V. Singh, S. C. Johnson, O. C. Okonkwo, Medical Imaging System Providing Disease Prognosis, US Patent 20160073969, 2016
2. **V. K. Ithapu**, A. K. Mishra, Cooperative Multi-Monostatic Synthetic Aperture Radar, Patent Number: 499/kol/2010

Awards

Interviewed by *CVPR Daily* (RSIP Vision) on interpretability of deep networks	Jul 2017
Patent Acceptance Award, Wisconsin Alumni Research Foundation (WARF)	Jul 2017
Finalist, Best Poster Award, Midwest Machine learning Symposium	Jun 2017
MICCAI Student Travel Award	Jun 2014
NIPS Student Travel Award	Oct 2013
Machine Learning Summer School (MLSS) Travel Scholarship	Jul 2012
DAAD - Working Internships in Science and Engineering (WISE) Scholarship	Feb 2009
Selected among top 1% in Joint Entrance Examination (JEE)	May 2005
Rudra Memorial Award - Topper in Higher Secondary	May 2003
Selected for National Maths Olympiad (top 5%)	Nov 2002

Toolboxes and GUIs

1. Incremental Multiresolution Matrix Factorization — Apr 2017
   `http://pages.cs.wisc.edu/~vamsi/projects/incmmf.html`
2. Design Choice in Deep Learning (R Shiny) — Feb 2017
   `http://pages.cs.wisc.edu/~vamsi/DLDesignChoices`
3. Rapid Permutation Testing in Neuroimaging (MATLAB) — Oct 2016
   `http://felipegb94.github.io/RapidPT/` (a patch for SnPM)
   Earlier Version – `https://www.nitrc.org/projects/efficient_pt/` — Jan 2014
4. Randomized Denoising Autoencoders for Neuroimaging (MATLAB) — Mar 2015
   `https://www.nitrc.org/projects/rdacodes/`
5. Wisconsin White Matter Hyperintensities Segmentation Toolbox (MATLAB) — May 2013
   `https://www.nitrc.org/projects/w2mhs/` ($>$ 1500 downloads on NITRC and SourceForge)

Reviewer Services

International Conference on Learning Representations (ICLR)	2017–
International Conference on Machine Learning (ICML), *Ad-Hoc*	2016–
Medical Image Computing and Computer Assisted Intervention (MICCAI)	2016–
Computer Vision and Pattern Recognition (CVPR)	2016–
Transactions on Medical Imaging (IEEE TMI)	2016–
International Conference on Computer Vision (ICCV), *Ad-Hoc*	2016–

	European Conference on Computer Vision (ECCV), *Ad-Hoc*	2016–
	Neural Information Processing Systems (NIPS)	2015–
	Journal of Magnetic Resonance Imaging (Wiley)	2015–
	Neuroimage (Elsevier)	2014

Student Mentoring

Aderajew Mengistu (B.S Bio)	Summer 2017
Nikhil Kannan (B.S CS/Math)	Spring 2017 - Summer 2017
Prithvi Chowhan (B.S CS/Math)	Spring 2017
Felipe Gutierrez-Barragan (B.S CS)	Summer 2015 - Fall 2016
Zeyuan Hu (B.S CS/Math)	Fall 2013 - Spring 2014
Christopher Lindner (B.S CS)	Spring 2013 - Summer 2014

Computer Skills

Languages	:	Matlab, Python, R, Mathematica, Octave
Softwares	:	Tensorflow, MatConvNet, AFNI, SPM, SnPM, VBM8, FSL IPE, HTML, LaTeX, VisualDSP++

References

Vikas Singh	vsingh@biostat.wisc.edu
Sterling C. Johnson	scj@medicine.wisc.edu
Risi Kondor	risi@cs.uchicago.edu
Grace Wahba	wahba@stat.wisc.edu